Supply And Cost Of Alternatives To MTBE In Gasoline

March 1, 1999

California Energy Commission

Background

- Legislative Mandate
  - May 12, 1997 hearing
  - Minimum 15 to 40 percent production decline
  - Line item in state budget
- Focus Of Commission's Report
  - Potential impacts on supply and cost of gasoline if MTBE phased out
  - Impacts of different transition time periods

Scope of Study

- MTBE Completely Displaced With An Alternative Oxygenate
  - ethanol, ETBE, TBA and TAME
- Gasoline Produced Without Any Oxygenates
- Federal Requirement For Minimum Oxygen Content Removed - MTBE Use Reduced

Study Design - Transition Time Periods

- Near Term - Immediate Phase Out
  - Limiting factors identified
- Intermediate Term (3 Years)
  - Minor refinery modifications
  - Oxygenate capacity expanded or converted
- Long Term (6 Years)
  - Major refinery modifications
  - New oxygenate capacity constructed

Key Findings

- Immediate Phase Out Would Be Drastic With Catastrophic Impact On Consumers
- Phase Out Over Three Years Costly But Feasible
- Phase Out Over Six Years Is Lowest Cost

Key Findings - Ethanol

- Intermediate Term
  - ➤ Increase costs 6.1 to 6.7 cents per gallon
  - ➤ 75,000 barrels per day of ethanol
  - ➤ Up to 142,000 barrels per day of additional gasoline imports
- Long Term
  - ➤ Increase costs 1.9 to 2.5 cents per gallon
  - ➤ 79,000 barrels per day of ethanol
  - ➤ Up to 113,000 barrels per day of additional gasoline imports

Key Findings - Ethanol With One Pound Volatility Waiver

- Intermediate Term
  - ➤ Increase costs 4.0 to 5.4 cents per gallon
  - ➤ 97,000 barrels per day of ethanol
  - ➤ Up to 38,000 barrels per day of additional gasoline imports
- Long Term
  - ➤ Range from a cost decrease of 0.8 cents to an increase of 1.0 cents per gallon
  - ➤ 103,000 barrels per day of ethanol
  - ➤ Up to 28,000 barrels per day of additional gasoline imports

Key Findings - ETBE

- Intermediate Term
  - ➤ Increase costs 2.4 to 2.5 cents per gallon
  - ➤ 129,000 barrels per day of ETBE
  - ➤ No additional gasoline imports required
- Long Term
  - ➤ No change in cost
  - ➤ 137,000 barrels per day of ETBE
  - ➤ No additional gasoline imports required

Key Findings - TBA

- Intermediate Term
  - ➤ Increase costs 0.5 to 1.4 cents per gallon
  - ➤ Up to 89,000 barrels per day of TBA
  - ➤ Up to 22,000 barrels per day of additional gasoline imports
- Long Term
  - ➤ Increase costs 0.3 to 1.0 cents per gallon
  - ➤ Up to 104,000 barrels per day of TBA
  - ➤ Up to 19,000 barrels per day of additional gasoline imports

Key Findings - Mixed Oxygenates

- Intermediate Term
  - ➤ Range from a cost decrease of 0.2 cents to an increase of 0.2 cents per gallon
  - ➤ Up to 101,000 barrels per day of ETBE & TBA
  - ➤ No additional gasoline imports required
- Long Term
  - ➤ Decrease costs 0.3 to 0.4 cents per gallon
  - ➤ 126,000 barrels per day of ETBE & TBA
  - ➤ No additional gasoline imports required

Key Findings - Reduced Use Of MTBE (HR 630)

- Intermediate Term
  - ➤ Decrease costs 0.2 to 0.8 cents per gallon
  - ➤ MTBE use declines by as much as 31 percent
  - ➤ No additional gasoline imports required
- Long Term
  - ➤ Decrease costs 0.3 to 1.5 cents per gallon
  - ➤ MTBE use declines by as much as 21 percent
  - ➤ No additional gasoline imports required

Key Findings - No Oxygenates

- Intermediate Term
  - ➤ Increase costs 4.3 to 8.8 cents per gallon
  - ➤ Up to 355,000 barrels per day of additional gasoline imports
- Long Term
  - ➤ Increase costs 0.9 to 3.7 cents per gallon
  - ➤ Up to 140,000 barrels per day of additional gasoline imports

Key Findings - No Imports

- Long Term Impacts on Ethanol Cases
  - ➤ Increase costs by an additional 0.2 cents per gallon
  - ➤ Additional $1.2 billion for refinery investments
- Long Term Impacts on No Oxygenate Cases
  - ➤ Increase costs by an additional 0.6 cents per gallon
  - ➤ Additional $1.4 billion for refinery investments

Key Findings - Marine Transportation Infrastructure

- Marine Terminals
  - ➤ Sufficient capacity to handle additional imports and exports without modifications
  - ➤ One exception - no oxygenates case for intermediate term
- Marine Vessels
  - ➤ Adequate supply of foreign vessels
  - ➤ Availability of Jones Act tankers a concern

Key Findings - Distribution Infrastructure

- Distribution Terminals
  - ➤ No modifications necessary for most alternative oxygenates
- Modifications Required To Use Ethanol
  - ➤ Would have to be blended at the terminals
  - ➤ Cost $60 million or about 0.1 cents per gallon
  - ➤ Construction would require up to 2 years to complete

Summary

- Immediate Phase Out Of MTBE, Without Suspension Of State And Federal Regulations, Would Be Infeasible
- Intermediate Phase Out
  - ➤ Could cost up to 6.7 cents per gallon
  - ➤ Cost up to 8.8 cents per gallon if all oxygenates phased out

Summary (cont.)

- Long Term Phase Out
  - ➤ Least costly, savings in some cases
  - ➤ Cost up to 3.7 cents per gallon if all oxygenates phased out
- Removal Of Minimum Oxygen Requirement Beneficial In All Cases And Any Time Period